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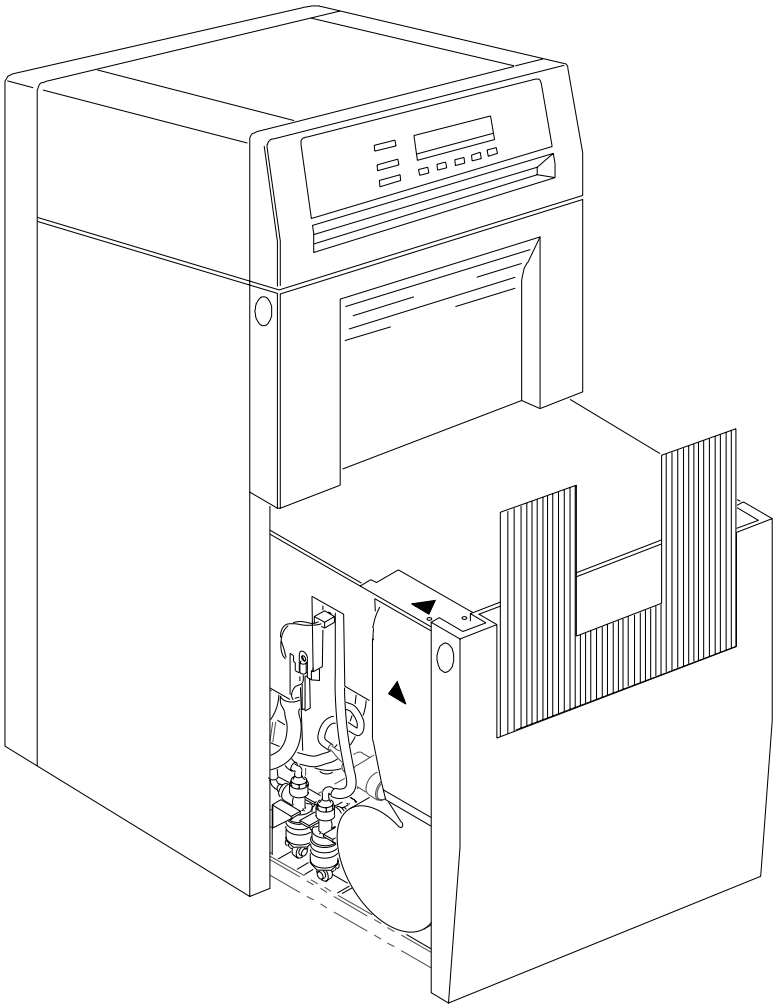
HEALTH IMAGING

DIAGNOSTICS
for the
Kodak X-Omat 3000 RA INTEGRATED PROCESSOR
in a Kodak X-Omat MULTILOADER 300 PLUS



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Section 1: Error Codes

Introduction and Definitions

Introduction

- The 500 BOARD monitors the PROCESSOR functions during normal operations, and continually checks for errors. When an error occurs, an error code is displayed on the DISPLAY PANEL.
- Error codes are displayed by priority.
- The lower the error code number, the higher the priority.
- More than one error code can occur at one time.
- When 2 or more error codes occur, only the error code with the highest priority will be displayed.
- When a high priority error code is corrected, the next priority error code is displayed.
- All errors are stored in an error log on the 500 BOARD. Use a PORTABLE COMPUTER and the correct software for access to the error log. The error log records the number of times an error occurred.
- There are 3 types of error code: Fatal, Non-Fatal and Warning.

NOTE: When errors occur, the MICROPROCESSOR BOARD might disable some components.

Use the PORTABLE COMPUTER and the diagnostic tests to analyze the components.

Fatal Errors

A Fatal Error indicates a problem which can cause a dangerous condition if the PROCESSOR continues to operate. If a sheet of film is being processed when a fatal error occurs, the film will exit the PROCESSOR. The PROCESSOR will stop operating and no new films can be inserted into the PROCESSOR. If additional sheets of film are inserted before the PROCESSOR stops operating, the film will exit the PROCESSOR, then the PROCESSOR will stop operating and no films can be inserted. If a Fatal Error occurs when the PROCESSOR is in the standby mode, the PROCESSOR will not operate and no films can be inserted. The operator cannot correct Fatal Errors. The operator should move BREAKER CB2, on the PROCESSOR, to the “off” or “O” position and make a call for service.

Non-Fatal Errors

A Non-Fatal Error will not prevent the PROCESSOR from operating. Film can be inserted into the PROCESSOR, but the image quality might decrease. The operator cannot correct most Non-Fatal errors.The operator should make a call for service.

Warning Errors

A Warning Error indicates a temporary condition or a problem which can be corrected by the operator. The PROCESSOR will operate and films can be inserted. Image quality might decrease.

All Errors

Important

When you check an electrical component or BOARD, also check all the:

- connections and CABLES for the component or BOARD
- voltages from the POWER SUPPLY for the component or BOARD

Fatal Errors

Code	Description	Possible Malfunction	Action
E001	500 BOARD	Corrupted software on the 500 BOARD	• Load the current software again. or • Install new PROMS/EEPROMS: U17, U19, and U20 on the 500 BOARD.
E002	Dryer over maximum temperature **Note** The maximum temperature is 79 C (175 F). Normally, the DRYER DC OVER-TEMPERATURE THERMOSTAT opens before the DRYER reaches this temperature.	DRYER THERMISTOR	Check that the resistance at 25 C (77 F) is approximately 10 KW.
		SOLID STATE RELAY U3 that controls the DRYER HEATER	Check SSR U3.
		500 BOARD	Install a new BOARD.
E004	Inoperative transport	See E041 in the Non-Fatal Errors Table.	
E005	Dryer over-temperature thermostat open	When this error occurs, the DRYER HEATER and BLOWER are disabled.	
			Allow THERMOSTAT to reset. If the THERMOSTAT opens again, determine the cause of the over-temperature condition. See E002.
E006	Initialization communication error	CABLE between PROCESSOR and MULTILOADER 500 BOARD	Install a new CABLE. Install a new BOARD.
E007	Developer thermistor failure	The DEVELOPER HEATER is disabled when this error occurs.	
		DEVELOPER THERMISTOR	Install a new THERMISTOR.
E008	Fixer thermistor failure	The FIXER HEATER is disabled when this error occurs.	
		FIXER THERMISTOR	Install a new THERMISTOR.
E009	Dryer thermistor failure	The DRYER HEATER is disabled when this error occurs.	
		DRYER THERMISTOR	Install a new THERMISTOR.
E010	Analog-to-digital converter failure	All 3 HEATERS are disabled when this error occurs.	
		500 BOARD	Install a new BOARD.

Non-Fatal Errors

Code	Description	Possible Malfunction	Action
E032	Developer tank fill error	This error will occur if the: • DEVELOPER TANK: – does not fill in 4 minutes in normal operation. – does not fill in 15 minutes in the Tank Fill Mode. – is empty and the operator does not select the Tank Fill Mode. • REPLENISHER TANK is empty. • REPLENISHMENT HOSE has an obstruction. • TANKS of the PROCESSOR are filled with water during the initial installation. The following parts will be disabled: • DEVELOPER REPLENISHMENT PUMP • RECIRCULATION PUMP • Temperature control for the fixer and developer To prevent the error from occurring during the initial installation: • add 240 mL (8 fl oz) of developer to the DEVELOPER TANK before you fill the PROCESSOR with water. • energize the RECIRCULATION PUMP to move the developer and remove any air bubbles. Use the diagnostics to energize the PUMP.	
		LEVEL PROBES	Clean and check the PROBES.
		The solution level in the REPLENISHER TANK is low.	Mix new developer solution.
		Solution does not flow through the HOSES between the REPLENISHMENT TANK and the REPLENISHMENT PUMP.	Check: • HOSE CLAMPS are tight • HOSES: – are round and opened – have no obstructions or air bubbles
		The DEVELOPER DRAIN VALVE is open.	Close the VALVE.
		SOLID STATE RELAY SSR U2 that controls the DEVELOPER REPLENISHMENT PUMP	Check SSR U2.
		POPPET VALVES in the DEVELOPER REPLENISHMENT PUMP	Clean and check the VALVES.
		DEVELOPER REPLENISHMENT PUMP	Check FUSE F1 and the REPLENISHMENT PUMP MOTOR B3.
		The 500 BOARD does not energize the SOLID STATE RELAY SSR U2.	If necessary, install a new BOARD.

Code	Description	Possible Malfunction	Action
E033	Fixer tank fill error	This error will occur if the: • FIXER TANK – does not fill in 4 minutes in normal operation. – does not fill in 15 minutes in the Tank Fill Mode. – is empty and the operator does not select the Tank Fill Mode. • REPLENISHMENT TANK is empty. • REPLENISHMENT HOSE has an obstruction. • TANKS of the PROCESSOR are filled with water during the initial installation. The following parts will be disabled: • FIXER REPLENISHMENT PUMP • RECIRCULATION PUMP • Temperature control for the fixer and developer To prevent the error from occurring during the initial installation: • add 240 mL (8 fl oz) of fixer to the FIXER TANK before you fill the PROCESSOR with water. • energize the RECIRCULATION PUMP to move the fixer and remove any air bubbles. Use the diagnostics to energize the PUMP.	
		LEVEL PROBES	Clean and check the PROBES.
		The solution level in the REPLENISHER TANK is low.	Mix new fixer solution.
		Solution does not flow through the HOSES between the REPLENISHMENT TANK and the REPLENISHMENT PUMP.	Check: • HOSE CLAMPS are tight • HOSES: – are round and opened – have no obstructions or air bubbles
		The FIXER DRAIN VALVE is open.	Close the VALVE.
		SOLID STATE RELAY SSR U4 that controls the FIXER REPLENISHMENT PUMP	Check SSR U4.
		POPPET VALVES in the FIXER REPLENISHMENT PUMP	Clean and check the VALVES.
		FIXER REPLENISHMENT PUMP	Check FUSE F1 and the REPLENISHMENT PUMP MOTOR B4.
		The 500 BOARD does not energize the SOLID STATE RELAY SSR U4.	If necessary, install a new BOARD.

Code	Description	Possible Malfunction	Action
E034	Unable to determine developer temperature	The DEVELOPER HEATER and the DEVELOPER COOLING SOLENOID is disabled when this error occurs.	
		DEVELOPER THERMISTOR: • open•circuit or short•circuit • Resistance not correct	• Check that the resistance at 25 C (77 F) is approximately 10k ohms. • If necessary, install a new DEVELOPER THERMISTOR
		500 BOARD: • A/D CONVERSION ELECTRONICS malfunction • PRECISION RESISTOR test failure	Install a new 500 BOARD.
		Ambient temperature is below 15 C (59 F).	Increase the ambient temperature, or de-energize and then energize the PROCESSOR.
		See EO37 for additional actions.	
E035	Unable to determine fixer temperature	The FIXER HEATER is disabled when this error occurs.	
		FIXER THERMISTOR: • open•circuit or short•circuit • Resistance not correct	• Check that the resistance at 25 C (77 F) is approximately 10k ohms. • If necessary, install a new FIXER THERMISTOR.
		500 BOARD: • A/D CONVERSION ELECTRONICS malfunction • PRECISION RESISTOR test failure	Install a new 500 BOARD.
		Ambient temperature is below 15 C (59 F).	Increase the ambient temperature, or de-energize and then energize the PROCESSOR.
		See EO39 for additional actions.	

Code	Description	Possible Malfunction	Action
E036	Unable to determine DRYER temperature	The DRYER HEATER is disabled when this error occurs.	
		DRYER THERMISTOR: • open•circuit or short•circuit • Resistance not correct	• Check that the resistance at 25 C (77 F) is approximately 10k ohms. • If necessary, install a new DRYER THERMISTOR
		500 BOARD: • A/D CONVERSION ELECTRONICS malfunction • PRECISION RESISTOR test failure	Install a new 500 BOARD.
		See EO40 for additional actions.	

Code	Description	Possible Malfunction	Action
E037	Loss of developer heating ability	DEVELOPER HEATER HR1 has an internal OVERTEMPATURE THERMOSTAT. When the HEATER is too hot, the OVERTEMPERATURE THERMOSTAT opens. Wait for the HEATER to cool and allow the THERMOSTAT to reset before you measure the resistance.	
		SOLID STATE RELAY U1(controls the DEVELOPER HEATER)	Check for correct operation of SOLID STATE RELAY U1. If necessary, install a new RELAY U1.
		DEVELOPER HEATER HR1: • open•circuit • Incorrect resistance	• Check FUSE F2. • Check that the resistance at 25 C (77 F) is approximately 50 ohms. • Install a new DEVELOPER HEATER HR1.
		500 BOARD does not energize the SOLID STATE RELAY U1: Malfunction of RELAY K504A	Install a new 500 BOARD.
		DEVELOPER COOLING SOLENOID L2	• Check that DEVELOPER COOLING SOLENOID L2 stops the developer flow through the HEAT EXCHANGER. • If necessary, install a new DEVELOPER COOLING SOLENOID L2.
		RECIRCULATION PUMP	• Check FUSE F1. • Check for the correct operation of MOTOR B5. • If necessary, install a new RECIRCULATION PUMP.
		See EO34 for additional actions.	

Code	Description	Possible Malfunction	Action
E038	Loss of developer cooling ability	Water does not enter the WASH TANK.	Check: • that water is supplied to the PROCESSOR. – The water supply is turned on. – The FILTER is clean. • WASH WATER SOLENOID L1 – The operation is correct. – The SCREEN has no obstructions. • DEVELOPER COOLING SOLENOID L2 • QUICK DISCONNECT
		The temperature of the water entering the WASH TANK is too hot.	Decrease the temperature of the water supply. The wash water must be a minimum of 5.5 C (10 F) below the set•point of the developer.
		HEAT EXCHANGER in the WASH TANK	Remove any obstructions from the EXCHANGER.
		The 500 BOARD does not energize SOLENOIDS L1 or L2	Check for 24 V DC at TERMINALS 1 and 2 on the: • WASH WATER SOLENOID L1 • DEVELOPER COOLING SOLENOID L2 If necessary, install a new BOARD.
		RECIRCULATION PUMP	Check the RECIRCULATION PUMP MOTOR B5. If necessary, install a new PUMP.
		The WASH TANK CLIP is not fully seated or is not installed.	Check that the CLIP is fully seated. If necessary, install the CLIP.

Code	Description	Possible Malfunction	Action
E039	Loss of fixer heating ability	FIXER HEATER HR2 has an internal OVERTEMPATURE THERMOSTAT. When the HEATER is too hot, the OVERTEMPERATURE THERMOSTAT opens. Wait for the HEATER to cool and allow the THERMOSTAT to reset before you measure the resistance.	
		SOLID STATE RELAY U5 (controls the FIXER HEATER)	Check for correct operation of SOLID STATE RELAY U5. If necessary, install a new RELAY U5.
		FIXER HEATER HR2: • open•circuit • Incorrect resistance	• Check FUSE F2. • Check that the resistance at 25 C (77 F) is approximately 50 ohms. • Install a new FIXER HEATER HR2.
		500 BOARD does not energize the SOLID STATE RELAY U5: Malfunction of RELAY K504B	Install a new 500 BOARD.
		RECIRCULATION PUMP	• Check FUSE F1. • Check for the correct operation of MOTOR B5. • If necessary, install a new RECIRCULATION PUMP.
		See EO35 for additional actions.	

Code	Description	Possible Malfunction	Action
E040	Loss of dryer heating ability	A PANEL or DRYER RACK is not installed.	Install the part.
		SOLID STATE RELAY U3 that controls the DRYER HEATER	Check SSR U3.
		RELAY K1 that enables the DRYER HEATER	Check K1.
		No continuity for the DRYER HEATER	Check that the resistance at 25 C (77 F) is approximately 16 W.
		DRYER OVER-TEMPERATURE THERMOSTAT	Allow the THERMOSTAT to reset. If the THERMOSTAT opens again, determine the cause of the high temperature. If you cannot determine the cause of the problem, install a new THERMOSTAT.
		No continuity for the DRYER HEATER THERMAL CUTOFF	Check that the DRYER BLOWER operates correctly. Install a new CUTOFF.
		500 BOARD: • The 500 BOARD does not energize the SOLID STATE RELAY SSR U3. • The RELAY K501 malfunctions.	If necessary, install a new BOARD.

<table>
<tr><th>Code</th><th>Description</th><th>Possible Malfunction</th><th>Action</th></tr>
<tr><td rowspan="5">E041</td><td rowspan="5">Loss of transport speed control
Note
This error occurs when the transport speed is set for 10 seconds and the speed is not within 7.6 cm/min (3 in./min) of the set•point.</td><td colspan="2">When the PROCESSOR operates normally:
• The supply voltage from the QUAD POWER SUPPLY through the 7000 BOARD to the DRIVE MOTOR CONTROLLER is 24 V DC at PIN 3 on the DRIVE MOTOR CONTROLLER.
• The control voltage at Test Point 10 on the 500 BOARD is approximately:
1.0 V DC for the Extended Speed
1.9 V DC for the Standard Speed
2.6 V DC for the Rapid Speed
3.4 V DC for the K/RA Speed
Note
There might be large variations in control voltages between PROCESSORS.

Feedback pulses from the DRIVE MOTOR CONTROLLER at Test Point 8 on the 500 BOARD indicate the speed of the DRIVE MOTOR.

If the transport operates slower than the set speed, the MICROPROCESSOR increases the control voltage approximately 25 mV every second at Test Point 8 on the 500 BOARD. When the voltage reaches 5 V DC, the MICROPROCESSOR stops increasing the voltage.</td></tr>
<tr><td>500 BOARD</td><td>If the control voltage is not correct at TP 10 on the 500 BOARD, install a new BOARD.</td></tr>
<tr><td>7000 BOARD</td><td>Install the PROCESSOR in the MULTILOADER and check for the following voltages on the 7000 BOARD:
• 24 V DC between PINS 1 and 10 of PJ7003
• 5 V DC between PINS 4 and 10 of PJ7003</td></tr>
<tr><td>DC DRIVE MOTOR B6 or DRIVE MOTOR CONTROLLER</td><td>If B6 operates, but no pulses occur at Test Point 8 on the 500 BOARD, check:
• B6
• CONTROLLER</td></tr>
<tr><td rowspan="3">E042</td><td rowspan="3">Loss of accessory data link</td><td>Loose connections</td><td>Check all connections between any accessory and the PROCESSOR.</td></tr>
<tr><td>500 BOARD</td><td>Install a new BOARD.</td></tr>
<tr><td>2000 BOARD</td><td>Install a new BOARD.</td></tr>
<tr><td>E045</td><td>Display data link error</td><td>CABLES between the 3000 and 500 BOARD</td><td>Check the CABLES.</td></tr>
</table>

Warnings

Error Code	Error Description	Possible Malfunction	Action
E128	PROCESSOR is not engaged in the MULTILOADER	When this error occurs, • the following function is disabled: – film transport • the following parts are disabled: – DRYER HEATER – BLOWER	
		PROCESSOR is extended.	Engage the PROCESSOR in the MULTOLOADER.
		INTERLOCK SWITCH S4	Check S4. If necessary, install a new S4.
		7000 BOARD	Install a new BOARD.
E129	Tanks currently being filled	When this error occurs, • the following function is disabled: – film transport • the following parts are disabled: – RECIRCULATION PUMP – 3 HEATERS – DRYER BLOWER	
		None	None. This message will clear automatically.
E130	Replenish pumps disabled	None	Use the KEYPAD to select either Automatic or Flooded Replenishment to enable the PUMPS.
E132	Developer under set temperature	None	None. This message will clear automatically when the developer reaches the set•point temperature.
E133	Developer over set temperature	None	None. This message will clear automatically when the developer reaches the set•point temperature.
E134	Dryer under set temperature	None	None. This message will clear automatically when the DRYER reaches the set•point temperature.
E141	Low developer tank level	When this error occurs, • the RECIRCULATION PUMP is disabled. • the temperature control for the fixer and developer is disabled.	
		None	This error will clear automatically when the developer solution reaches the correct level.
E142	Low fixer tank level	When this error occurs, • the RECIRCULATION PUMP is disabled. • the temperature control for the fixer and developer is disabled.	
		None	This error clears automatically when the fixer solution reaches the correct level.

Section 2: Mechanical Diagnostics

Transport Malfunction

Possible Cause	Check
RACK and CROSSOVER ASSEMBLIES	RACK and CROSSOVER ASSEMBLIES:correct positionsseated correctly • squareness – See ADJUSTMENTS and REPLACEMENTS, Publication No. 7C8285, RACKS and CROSSOVERS. Adjusting the Squareness of the CROSSOVERS Adjusting the Squareness of the RACKS • cleaned completely – See the PREVENTIVE MAINTENANCE, Publication No. 7C8289. CROSSOVER TROUGHS correct positions WASH RESERVOIR installed correctly
ROLLER ASSEMBLIES	ROLLERS • correct positions • rotate freely • GUDGEONS – no damage – If necessary, install new ROLLERS. GEARS, SPROCKETS, and IDLERS • engage correctly • not broken or worn BEARINGS no wear SPRINGS and E-RINGS not broken or missing RACK ASSEMBLY • DRIVE CHAIN – tension
DRYER	AIR TUBE BAFFLES installed Temperature setting of the DRYER lowest possible setting to provide the best image quality DRYER RACK seated correctly LOCKING TABS correct positions DRIVE GEAR on the DRYER RACK no damage

Artifacts and Wrong Film Densities

Possible Cause	Check
Replenishment system	Replenishment rates correct setting HOSES • opened and round • no obstructions or air bubbles HOSE CLAMPS • tight REPLENISHMENT PUMP • operation • calibration Replenishment chemicals • Change any chemicals that are: – not mixed correctly – exhausted – contaminated **Note** When you mix chemicals: • Mix a maximum of a 2-week supply of the DEVELOPER RELENISHER. • Follow all directions for mixing chemicals and solutions. • Use a SPLASH GUARD and DRIP TRAY when you remove the FIXER RACK from the PROCESSOR to prevent contamination of the developer. DEVELOPER and FIXER TANKS • DRAIN VALVES – completely closed
Recirculation system	DEVELOPER and RECIRCULATION HOSES • ORIFICES – no obstructions DEVELOPER FILTER If necessary, install a new FILTER. Movement of the solutions at the surface of the PROCESSOR TANKS when you energize the PROCESSOR and the TANKS are full. • If the solutions do not move, check: – HOSES have no obstructions or air bubbles in the recirculation system. – RECIRCULATION PUMP operates. – DEVELOPER FILTER is clean and in the correct position.

Possible Cause	Check
RACK and CROSSOVER ASSEMBLIES	RACKS and CROSSOVERS • correct positions • seated correctly • cleaned completely – See the PREVENTIVE MAINTENANCE, Publication No. 7C8289. CROSSOVER TROUGHS and EVAPORATION COVERS • correct positions • TROUGHS – clean • TROUGH DRAINS – no obstructions WASH RESERVOIR installed correctly
ROLLERS	ROLLERS • clean and not scratched • correct positions • rotate freely • GUDGEONS – no damage – If necessary, install new ROLLERS. DETECTOR ROLLERS clean GEARS, SPROCKETS, and IDLERS • engage correctly • no wear BEARINGS no wear SPRINGS and E-RINGS not broken or missing DEVELOPER and FIXER RACK ASSEMBLIES • DRIVE CHAINS – correct adjustment of the tension
Drying system	DRYER AIR TUBES • clean – If necessary, use a BOTTLE BRUSH and water to clean the TUBES and SLOTS in the TUBES. • BAFFLES – installed Temperature setting of the DRYER • lowest possible setting to provide the best image quality • exhaust for the PROCESSOR – meets the specifications – See the MULTILOADER 300 PLUS SITE SPECIFICATIONS.

Possible Cause	Check
Wrong water temperature	Temperature of the water Should be: 6.7 C (12 F) below the developer set point
Wash water	Water flows through the WASH RACK Holes in the WASH RESERVOIR • clean
Ventilation system	Exhaust for the PROCESSOR • meets specifications • See the MULTILOADER 300 PLUS SITE SPECIFICATIONS. External EXHAUST HOSE connected to the AIR EXHAUST Internal EXHAUST HOSE connected to the AIR EXHAUST

Wet Films

Possible Cause	Check
Film and chemicals are not compatible	Film • compatible with selected system
Replenishment system	Replenishment rates • correct setting HOSES • opened and round • no obstructions HOSE CLAMPS • tight REPLENISHMENT PUMP • operation • calibration Replenishment chemicals • Change any chemicals that are: – not mixed correctly – exhausted – contaminated **Note** When you mix chemicals: • Mix a maximum of a 2-week supply of the DEVELOPER RELENISHER. • Follow all directions for mixing chemicals and solutions. • Use a SPLASH GUARD and DRIP TRAY when you remove the FIXER RACK from the PROCESSOR to prevent contamination of the developer. DEVELOPER and FIXER TANKS • DRAIN VALVES – completely closed

Possible Cause	Check
Recirculation system	Movement of the solutions at the surface of the PROCESSOR TANKS when you energize the PROCESSOR and the TANKS are full. • If the solutions do not move, check: – HOSES have no obstructions or air bubbles in the recirculation system – RECIRCULATION PUMP operates – DEVELOPER FILTER is clean and in the correct position
Drying system	DRYER AIR TUBES • clean – If necessary, use a BOTTLE BRUSH and water to clean the TUBES and SLOTS in the TUBES. • BAFFLES – installed DRYER • lowest possible setting to provide the best image quality DRYER AIR EXHAUST • no obstructions • installed correctly – See the Installation Instructions, Publication No. 5B9330. DRYER HEATER • operates correctly DRYER RACK • seated correctly
Wash water	Water flows through the WASH RACK Holes in the WASH RESERVOIR • opened – If necessary, clean the holes to prevent an overflow of water from the TROUGHS into the DEVELOPER and FIXER TANKS.

Solution Levels

Possible Cause	Check
Replenishment system	Replenishment rates • correct setting HOSES • opened and round • no obstructions REPLENISHMENT PUMP • operation • calibration REPLENISHMENT TANKS • quantity of solution POPPET VALVES • clean • no damage DEVELOPER and FIXER TANKS • DRAIN VALVES – no leakage CROSSOVER TROUGHS • correct position • TROUGHS – clean • TROUGH DRAINS – no obstructions

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